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Agent-Based Model for Integrated Pest Management with Periodic Control Strategies

We consider an agent-based model (ABM) for integrated pest management (IPM). The model incorporates stage structure for both the pest species and the predator species. In this model, the two control strategies of augmentation of predator species and application of pesticide and the pest births occur periodically at possibly different frequencies. We determine conditions under which either the pest species is eradicated or both species persist. We also investigate how varying the frequency of the augmentation of the predator species and the application of pesticide with respect to the frequency of the pest births affects the amounts of augmentation and pesticide needed to obtain pest eradication and permanent solutions. We then compare pest eradication and permanent solutions in the ABM to those in an analogous models using impulsive differential equations and difference equations.

Key words: Agent-Based Models, Integrated Pest Management, Impulsive Differential Equations